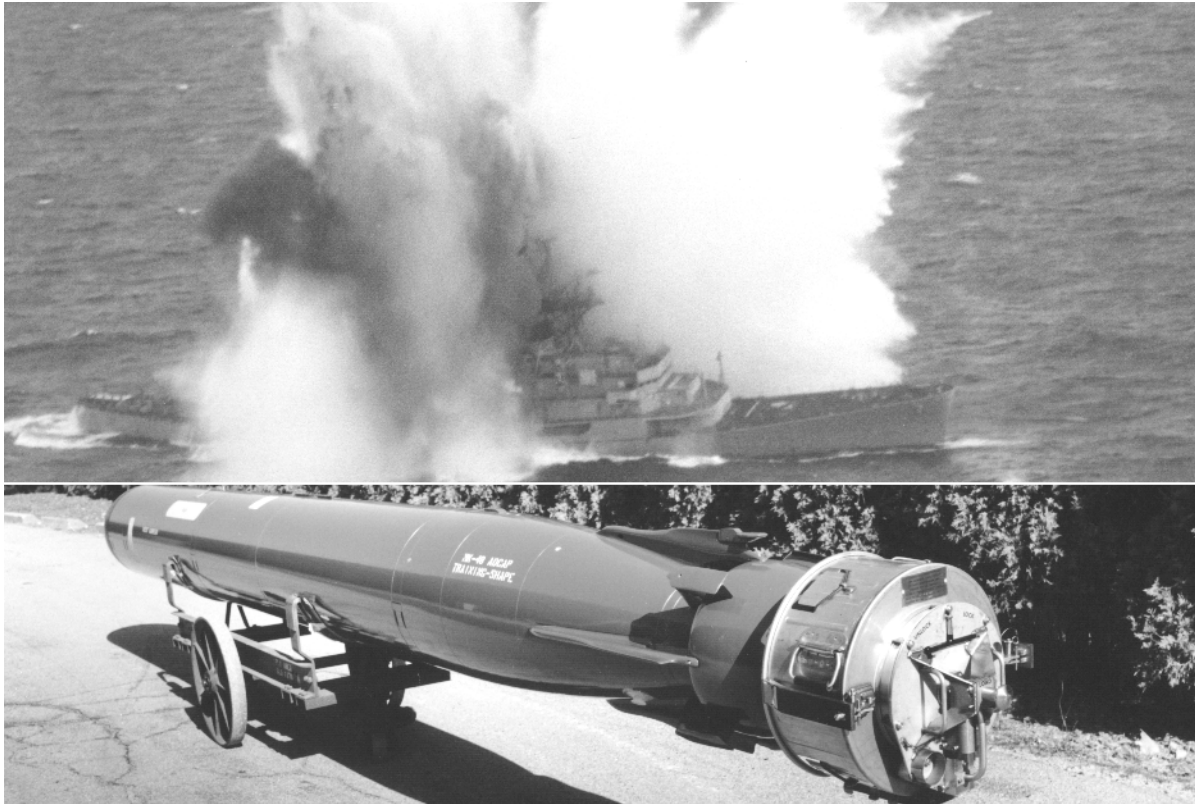


MK 48 ADCAP TORPEDO UPGRADES



Navy ACAT III Program

Total Number of Systems:	MK 48 Mod 5: 1,087 MK 48 Mod 6: 285
Total Program Cost (TY\$):	Through FY99: \$261M Through FY00: \$314M
Average Unit Cost (TY\$):	\$51K
Full-rate production:	Block III: 4QFY97 Block IV: 2QFY01 COT-DV: Under Review CBASS: 3QFY05

Prime Contractor

Northrop Grumman & Raytheon
Electronic Systems

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2010

The MK 48 ADCAP torpedo is a submarine launched, heavyweight acoustic homing torpedo with sophisticated sonar and an influence-fuzed warhead. The improved ADCAP torpedo includes all digital guidance and control systems, digital fusing systems, and propulsion improvements, which add speed, depth, and range capability. The Mk 48 class torpedoes are the Navy's only submarine launched torpedoes used for engagement of submarine and surface targets, contributing significantly to the submarines' *precision engagement*. They are also essential to the *force protection* role of submarines. There are a number of upgrades to the ADCAP torpedo discussed in the following paragraphs.

There are two hardware modifications to the baseline ADCAP (MK 48 Mod 5), called the G&C (Guidance and Control) MOD and the TPU (Torpedo Propulsion Upgrade) MOD. The G&C MOD replaces the obsolete guidance and control set with current technology, improves the acoustic receiver, adds memory, and improves processor throughput to handle expanded software demands. The TPU MOD improves the torpedo as described in the classified version of this report. Combined, these two hardware modifications comprise the MODS ADCAP (MK 48 Mod 6). A follow-on hardware change to the Mod 6 ADCAP, called the Common Torpedo Development Vehicle (COT-DV), had been planned for fleet introduction in FY01, but is now under review with anticipated introduction no earlier than FY03. COT-DV is a common processor that will use Commercial-off-the-Shelf hardware and require fewer circuit cards than current G&Cs, which may increase its reliability. Its additional processing power may also enable future software enhancements. Another hardware upgrade, Common Broadband Advanced Sonar System (CBASS) is planned for FY05, and its capabilities are described in the classified version of this report.

Three software builds are currently under oversight. Block Upgrade III (BU III) provides near-term improvements to the Mod 5 ADCAP. BU IV, currently under development, is intended to provide mid-term improvements to the Mod 6 ADCAP. The even more sophisticated CBASS software will follow BU IV. All are described in the classified version of this report.

BACKGROUND INFORMATION

The ADCAP torpedo OPEVAL and B-LRIP report were completed in 1988. ADCAP was reported to be operationally effective against certain threats, but not operationally effective against other threats at that time. The system was reported operationally suitable. The Navy subsequently authorized full-rate production, but Congress constrained procurement because of the concerns identified in test reporting. Modifications were implemented by the Navy to improve performance in certain scenarios, upgrade fuzing systems, and improve reliability. These modifications were considered effective. In 1994, a second software upgrade was introduced to improve performance and reliability. DOT&E assessed ADCAP to be operationally effective following this improvement, but some areas remained unsatisfactory. Additional detail, including areas in which DOT&E reached different conclusions than those reached by COMOPTEVFOR, are discussed in the classified versions of the FY94 and FY95 Annual Reports.

The Mod 6 ADCAP, intended to address open issues from previous OT&E, was tested in 1995 and reported in the 1996 B-LRIP report. DOT&E assessed Mod 6 ADCAP to be both operationally effective and suitable. Although the reliability was marginally below threshold, DOT&E identified Mod 6 ADCAP as producing a much better total performance against the COEA threat than the baseline Mod 5 ADCAP. Based on modeling and simulation and on torpedo test data, DOT&E also assessed the Mod 6 ADCAP to provide a significant advantage against nuclear submarines using some difficult evasion tactics, although testing was not conducted against submarines employing these specific tactics.

More detail is provided in the classified version of this report.

TEST & EVALUATION ACTIVITY

With the encouragement of DOT&E, the Program Office has taken a lead in a Target-Threat Simulation Validation (TTV) IPT in an effort to provide agreement on the optimal and most realistic threat simulation for both DT and OT for the CBASS. This was the first such target simulation effort by

the submarine force, and it was quickly expanded to encompass all undersea warfare testing, including the SEAWOLF and VIRGINIA programs. TTV has already been used to justify funding applications for both the USS Dolphin upgrade and foreign countermeasure acquisition programs.

This fiscal year's primary littoral DT for Block IV was held in the Cape Cod Operating Areas in October 1998. In September 1999, a second Block IV DT occurred in the Cape Cod Operating Areas. More details are provided in the classified version of this report.

In November 1998, The Navy conducted an ASW exercise in the East Sea to demonstrate ADCAP's performance in an actual threat environment. This historic test represented the first ADCAP firings in non-allied waters. In September 1999, a similar exercise was conducted in the Arabian Gulf. More details are provided in the classified version of this report.

The Prospective Commanding Officer (PCO) school once again cooperated with the ADCAP program in its run designs to ensure that some of the events would provide useful torpedo DT data. More details are provided in the classified version of this report.

The Navy planned to conduct a live-fire warshot torpedo exercise in FY99, but the event was not completed because air and surface units sank the target prior to engagement by the submarine. In March 1999, a warshot ADCAP was fired at the derelict merchant vessel *New Carissa*, which had grounded off the coast of Oregon and had to be scuttled. Explosives placed onboard and surface warship gunfire had damaged the *New Carissa*, but a submarine was called in to deliver the coup de grace after the derelict resisted going down.

In March 1999, a U.S. SSN engaged a Dutch Walrus Class diesel-electric submarine in a cooperative exercise at the Atlantic Undersea Test and Evaluation Center. More details are provided in the classified version of this report.

In FY00, the Navy is planning many ADCAP torpedo exercises, including a Cape Cod DT and OPEVAL, four PCO Operations, and further cooperative exercises with Australian and Dutch submarines. This ambitious schedule competes with TEMP critical operational issues test needs, which this report describes.

TEST & EVALUATION ASSESSMENT

Testing has been conducted in accordance with the approved TEMP, with some exceptions. More details are provided in the classified version of this report. A TEMP revision is planned for FY00 to accommodate acquisition strategy adjustments caused by the delay in COT-DV hardware development.

Some required capabilities have still not been adequately tested for Block III. More details are provided in the classified version of this report.

The Navy has not funded or provided shallow water scoring instrumentation in lieu of a shallow water test range, which had been agreed to in the TEMP by the Program Office and Sponsor (OPNAV N87). The Navy did not provide this resource for the 1998 or 1999 autumn exercises off Cape Cod; and did not fund this instrumentation for OPEVAL in September 2000. The fact that an instrumented scoring range, as required by the TEMP, will not be available before FY02 creates a potential stumbling block for September 2000 Block IV OPEVAL.

The results of the PCO exercises continue to be extremely useful in assessing ADCAP performance. More details are provided in the classified version of this report.

Block IV DT is described in detail in the classified version of this report.

Details of the November 1998 East Sea torpedo exercise are provided in the classified version of this report.

The September 1999 ADCAP exercise in the Arabian Gulf provided an opportunity to observe ADCAP in another actual threat littoral environment. More details are provided in the classified version of this report. Notably to the Navy's credit, ADCAP testing is now occurring in actual littoral threat environments.

Details of the *New Carissa* ADCAP launch are provided in the classified version of this report, including DOT&E recommendations for further warshot firings.

Details of the Dutch exercise are provided in the classified version of this report.

A number of performance issues remain unresolved; some of which the Navy is attempting to address through the Block IV software upgrade. More details are provided in the classified version of this report.

WAF performance continues to need significant improvement. WAF is undergoing hardware upgrades designed to run more complex models, particularly for the environment (water and bottom) and the target. The upgrade has been on schedule and a validation effort is planned this year to support the September 2000 Block IV OPEVAL. Until WAF performance significantly improves, DOT&E does not endorse WAF results for operational testing.

Reliability problems continue to run in cycles, with current concerns provided in the classified version of this report.

CONCLUSIONS, RECOMMENDATIONS, LESSONS LEARNED

As cited in previous reports, some performance questions remain unresolved due to inadequate T&E funding. The Navy has been slow to fund these initiatives. Details are provided in the classified version of this report.

The Navy's approach of working with foreign diesel submarines, testing ADCAP in actual threat littoral environments, and employing an actual off-the-shelf warshot weapon were all positive FY99 initiatives that reflect the Navy's willingness to realistically assess where it stands in littoral undersea warfare, and these initiatives should continue. More details are provided in the classified version of this report.